

Claims

- [c1] A system to disconnect at least one drive wheel from a vehicle with an electric motor connected to a powertrain, comprising:
- the powertrain having an electric motor mechanically connected to an output shaft, the output shaft mechanically connected to at least one axle, the axle mechanically connected to at least one drive wheel;
 - the axle further comprising a means to mechanically disconnect the output shaft from at least one drive wheel;
 - a vehicle system controller comprising input from an inertia switch and electric motor conditions, and can activate the means to mechanically disconnect the output shaft from the drive wheels in predetermined vehicle conditions.
- [c2] The system of claim 1 wherein the predetermined vehicle conditions comprise activation of the inertia switch.
- [c3] The system of claim 1 wherein the predetermined vehicle conditions comprise abnormal electric motor conditions.
- [c4] The system of claim 1 wherein the VSC further comprises monitors for driver demand for four wheel drive, two wheel drive, and neutral tow and activates the means to mechanically disconnect the output shaft from at least one drive wheel to meet that demand.
- [c5] The system of claim 1 wherein the VSC further comprises input to monitor whether a means to reset an activated inertia switch has been activated and accordingly deactivates the means to mechanically disconnect the output shaft from the drive wheels.
- [c6] The system of claim 3 wherein the electric motor conditions comprise motor over-current, motor over-torque, and motor over-temperature.
- [c7] The system of claim 1 wherein the means to mechanically disconnect the output shaft from the drive wheels comprises a disconnect actuator and joint attached to an axle disconnect.

- [c8] The system of claim 7 wherein the axle disconnect is electric powered.
- [c9] The system of claim 7 wherein the axle disconnect is vacuum powered.
- [c10] The system of claim 7 wherein the axle disconnect is a center disconnect.
- [c11] The system of claim 7 wherein the axle disconnect is a wheel-end disconnect.
- [c12] The system of claim 10 wherein the axle is a conventional axle.
- [c13] The system of claim 11 wherein the axle is a limited slip axle.
- [c14] A method for disconnecting at least one drive wheel from a vehicle with an electric motor connected to a powertrain having an electric motor mechanically connected to an output shaft, the output shaft mechanically connected to at least one axle, the axle mechanically connected to at least one drive wheel, the steps comprising:
- monitoring input from an inertia switch and electric motor conditions;
 - predetermining vehicle conditions to disconnect the output shaft from the drive wheels; and
 - disconnecting the output shaft from at least one drive wheel when the predetermined vehicle conditions occur.
- [c15] The method of claim 14 wherein the step of predetermining vehicle conditions to disconnect the output shaft from the drive wheels comprises the step of determining that the inertia switch has been activated.
- [c16] The method of claim 14 wherein the step of predetermining vehicle conditions to disconnect the output shaft from the drive wheels comprises the step of determining abnormal electric motor conditions exist.
- [c17] The method of claim 14 wherein the step of disconnecting the output shaft from at least one drive wheel uses electric power.
- [c18] The method of claim 14 wherein the step of disconnecting the output shaft from at least one drive wheel uses vacuum power.